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File Code: 3420

Date: JUL 16 1998

Subject: Issues and Pests of Special Concern, Foresthill Genetic Resource Center,
Foresthill Ranger District, Tahoe National Forest

To: Forest Supervisor, Tahoe National Forest

Enclosed is a copy of "Issues and Pests of Special Concern, Foresthill Genetic Resource Center." In this report transmission of black stain root disease, silver spotted tiger moth, western gall rust and other concerns of the manager of the Foresthill Genetic Resource Center are discussed and monitoring guidelines provided. The monitoring guidelines are approximate. If Genetic Resource Center personnel have pest-related questions, they are encouraged to contact my staff anytime.

If you have questions or comments concerning this report, contact Susan Frankel at (415) 705-2651 of my staff.

for /s/John Kliejunas
JOHN NEISESS, Acting Assistant Regional Forester
State and Private Forestry

Enclosure

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Forest Pest Management

Pacific Southwest Region

Report No. R98-01

3420 Pest Management Evaluation
July 15, 1998

Issues and Pests of Special Concern, Foresthill Forest Genetics Center, Foresthill Ranger District, Tahoe National Forest

Susan J. Frankel and Bill Woodruff, Plant Pathologists
Sheri Smith and John W. Dale, Entomologists

On June 18, 1998 the following FPM personnel visited Foresthill Forest Genetics Center: Susan Frankel, plant pathologist and John Dale, entomologist, RO, San Francisco; and Bill Woodruff, plant pathologist, and Sheri Smith, entomologist, NE CA Shared Service Area FPM office, Susanville; they were accompanied by Larry Binder, Foresthill Genetic Resource Center manager and Paul Stover, North Zone geneticist. The purpose of the visit was to go over a list of issues and pests of special concern as identified by Larry Binder. This document addresses each item on the list.

Black stain root disease in an 18 acre, 30 year-old Douglas-fir pollen buffer.

Leptographium wageneri, the cause of black stain root disease, has been causing tree mortality in three small areas of a Douglas-fir plantation established as a pollen buffer (see map, "Future disease resistant clone bank," north end of the Center). Suppression funding has been awarded and the area is scheduled to be clear-cut this summer. Several questions about black stain were raised by the Foresthill staff or FPM biologists.

1. How will black-stain vectors respond to the clear-cut? Will the vectors be triggered to look for new homes in surrounding stands? Should anything be done to prevent damage to other Douglas-fir plantations?

John Pronos, plant pathologist, made the following recommendations to keep insect activity to a minimum. The clear-cut should be done in summer, after the flight period of *Hylastes* (bark beetle vector of the pathogen). Slash disposal should be done to minimize insect build-up. All tree parts should be removed including stumps and roots. No tree parts should be left on site. Burning or chipping all



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non-commercial tree parts is acceptable. These practices should keep insect populations from increasing. However, the resident insects will attempt to migrate to other local habitats. Douglas-fir black stain is only harmful to Douglas-fir; other species should not be affected by black stain. The insects alone are not expected to do significant damage in surrounding stands. The insects are primarily attracted to stressed trees. If Douglas-fir trees in surrounding stands are not stressed, there should be no problem.

2. Should insect vectors be monitored to predict black stain outbreaks?

Don Goheen, entomologist/plant pathologist for the Forest Service in Medford and an expert in black stain, believes that it is very difficult to successfully predict when black stain will develop based on monitoring insect vectors. There are several reasons why prediction monitoring is difficult. First trapping the insects is not easy. Once you trap the insects you need to determine how many insects are actually involved in vectoring the pathogen since the percentage of the insect population carrying spores varies from site to site. In some areas as low as 2% of the population are vectors, yet the pathogen is transmitted. In other areas the percentage of insects carrying the pathogen is higher, yet the pathogen is not transmitted. Because of this variability, determining the threshold for damage is very complex. In summary, it would require a research project to develop a system where you could monitor for black stain with insect trapping and even then the results would not be guaranteed. Given the limited amount of Douglas-fir in your seed orchard, the resource you are trying to protect does not warrant this level of investment. If you have more questions concerning monitoring insect vectors for black stain, Don can be reached at 541-858-6125.

3. Does pruning and bark-scoring attract vectors for black stain?

Any stress or wound will increase the risk of black stain developing in the Douglas-fir. However, bole and branch wounds are less attractive to the insects that vector black stain; they prefer root wounds and stumps. Since the bark-scoring is needed to overcome graft incompatibility, the benefit outweighs the slight increase in risk. To prevent the introduction of all pathogens the bark-scoring knife should be cleaned between trees. A dip in alcohol or Lysol can be used, and is less corrosive than bleach. Prompt removal and burning of the slash created by pruning would also reduce the risk of black stain development.

4. Has anyone looked into resistance of Douglas-fir to black stain?

Bill Otrrosina, USDA FS researcher now located in Athens, Georgia identified differences in virulence among isolates of black stain from Douglas-fir. As far as variation in the host, Bill Otrrosina also tested 10 families of Douglas-fir at the Institute of Forest Genetics at Placerville. Based on observations on inoculated seedlings, he found significant variation within the 10 families (William Otrrosina, personal communication 6/25/98).

5. Is there a stump treatment for prevention of black stain

Of course, removal of stumps and associated roots is one treatment recommended for black stain. As far as a biological treatment, we do not know of one. Since the black stain pathogen does not survive in stumps you are really looking for a material that will prevent insects from being attracted to stumps.

General comments on black stain prevention and management

The following increase risk of black stain development: soil disturbance, tree stress, soil compaction, skid trails, and thinning. When carrying out management activities in the orchard, especially in Douglas-fir, these practices should be avoided during peak flight periods of the vector (spring and early summer). In any future Douglas-fir plantings, plant at a wide-spacing so thinning is not needed. If thinning is required, it should be done in summer, after the *Hylastes* flight period.

Monitoring for black stain. Symptoms of black stain can take a few years after infection to appear. In general, the larger the tree the longer it will take for symptoms to appear. Symptoms are the same as for other root diseases: chlorosis, thinning of the crown, reduced new growth, followed by mortality. Center personnel have observed black stain symptoms in the pollen buffer. Monitoring for symptomatic trees should be an on-going practice. If lack-luster growth and other symptoms appear the Center should contact FPM personnel.

Western gall rust in ponderosa pine

Ponderosa pines in clone banks were cursorily checked for galls caused by *Peridermium harknessii*. None were seen. Symptoms of gall rust include: round swellings (galls), branch dieback or discolored, stunted foliage. If galls are noticed on branches, they can be pruned out.

Monitoring for gall rust should be on-going whenever Center personnel are in the plantation. If infection is seen on over 10% of trees, or branch or foliage dieback in a tree affects more than 15% of the crown, contact FPM personnel if you need additional assistance.

White fir root stock shoot dieback

White fir were examined to view shoot dieback. Bill Woodruff had photographs taken last Fall of individual trees, so disease progression could be viewed. Branches that had brown needles last Fall, showed shrivelled areas with no needles. However, trees had abundant new growth; previously damaged areas were difficult to see because of all the healthy branchlets growing on top of them. The lower portion of tree crowns also had many mechanical wounds, apparently from mower damage. The cause of the dieback is not known, but it does not appear to be affecting the overall health and vigor of the trees.

Monitoring. These trees should be watched closely, particularly in the autumn. If there is a noticeable increase in injury, or if reduced new growth is present on 10% or more of trees, contact FPM if further assistance is needed.

Evaluate potential pest problems in the two SMZ's within the orchard boundary.

Sheri Smith estimated the basal area in spots of the SMZ (stream management zone) to be over 300 sq. ft./acre. A general target basal area for this stand type would be approximately 100 sq. ft./acre. She also noted that there were many broken-off tree-tops scattered on the ground. The relatively high basal area and subsequent reduced growth and vigor of the trees due to competition will increase the pine trees' susceptibility to bark beetle-related mortality, particularly during protracted drought periods. The dense

stand condition, accumulation of broken tops on the ground and the amount of understory vegetation creates a high risk for negative impacts associated with wildfire. Thinning the SMZ and maintaining it as a fuelbreak would decrease the risk of fire to the SMZ and seed orchard, and reduce bark beetle-related mortality.

Silver spotted tiger moth in white fir

The silver spotted tiger moth (*Lophocampa argentata*) is rarely a problem in other than valued ornamental trees. The damage is usually aesthetic rather than a reduction of growth, reproduction or survivability. Parasites, predators and weather usually limit infestations to one season. Should an infestation interfere with genetic studies or seed collections, larvae can be suppressed by application of registered pesticides to infested portions of the tree crown.

Monitoring. Continue to monitor all conifers for defoliation. Defoliation is most commonly seen in the spring and early summer.

Sequoia pitch moth on ponderosa pine

The sequoia pitch moth (*Synanthedon sequoiae*) has been relatively abundant on certain ponderosa pines at the Foresthill Forest Genetics Center over the past two decades. Several of these trees were recently removed when they became surplus to the goals and objectives of the Center's programs, others remain. The abundance of pitch masses on these pines may indicate a genetic predisposition to susceptibility and could be used as an evaluation factor of the seed source in future regeneration efforts. At present, none of the pines are sufficiently infested to influence growth, cone set, or survival.

Although healthy trees are sometimes attacked, trees whose trunks or limbs have been mechanically injured are especially susceptible to infestation. Wounds inflicted during the spring just before the adult moths fly, and during the summer when the moths are emerging, are far more likely to be attacked than trees wounded in the fall or early winter. If limiting attacks is a management objective then pruning can be confined to the time of year when it is unlikely to contribute to increased pitch moth attack.

Reinfestation of the same tree year after year is common; therefore, it has been suggested that these "brood" trees should be removed. If tree removal is not an option, orchard maintenance could remove the pitch masses and larvae, and treat the wounds with a tree wound paint. The insecticidal sprays recommended for treating deciduous trees infested with boring larvae probably would also be effective against these pitch mass borers. Contact Sheri Smith if additional information is needed.

Monitoring. Continue to monitor for trees with pitch masses. If the infection rate appears to increase dramatically in terms of number of trees affected or number of pitch masses per tree within a year, contact FPM personnel for further assistance.

Scale insects on sugar pine

From time to time, various sugar pines at Foresthill have been infested with black pineleaf scale (*Nuculaspis californica*). Usually the lower branches were the most severely affected and the infestation

decreased upward in the crowns; upper whorls (the cone-bearing branches) were little affected. Lady bird beetles frequently were abundant in the lower branches and preyed heavily upon the scales. Some of these pines have been removed for programmatic reasons, others remain and appear to have few scales present. However, a few sugar pines that had low scale populations in the past now appear to be in an infestation pattern similar to that of past increases. This infestation probably will remain confined to the affected trees because they are isolated from other sugar pines and the black pineleaf scale can become highly adapted to its particular host tree and movement to other trees is often slow to develop. Infestations are commonly associated with environmental conditions that disrupt the normally effective control exerted by natural enemies. Accumulation of dust from the roads may be one of the factors contributing to the current infestation.

Nature can be allowed to take its course, or the lower infested branches could be spot-treated with an appropriate registered contact insecticide. This should be timed to the spring hatch of the eggs and the dispersal of the "crawler" nymphs to feeding sites on the needles. The waxy cover developed by nymphs after they have settled protects the scales from the effects of contact insecticides. Systemic insecticides are more effective, but even these have limited success in large trees. If insecticidal control is deemed necessary, FPM entomologists can assist with identifying the appropriate timing, methods and materials for treatment.

Orchard practices and pest interactions

Site preparation- The Forest Genetic Center does a very thorough job of site preparation. They have not experienced many pest problems which is a reflection of their excellent management.

Pruning - Pruning wounds can serve as infection courts for many stem and foliar diseases. However, it seems like mowing is causing even more damage in unpruned lower branches. In particular, wounds that are in contact with the ground should be avoided. Because pruning removes the branches with wounds that may contact soil, it is probably beneficial. Pruning also improves air circulation, which can prevent foliage diseases. There is a chance that a pathogen could be moved from tree to tree on contaminated pruners. Pruners should be cleaned periodically.

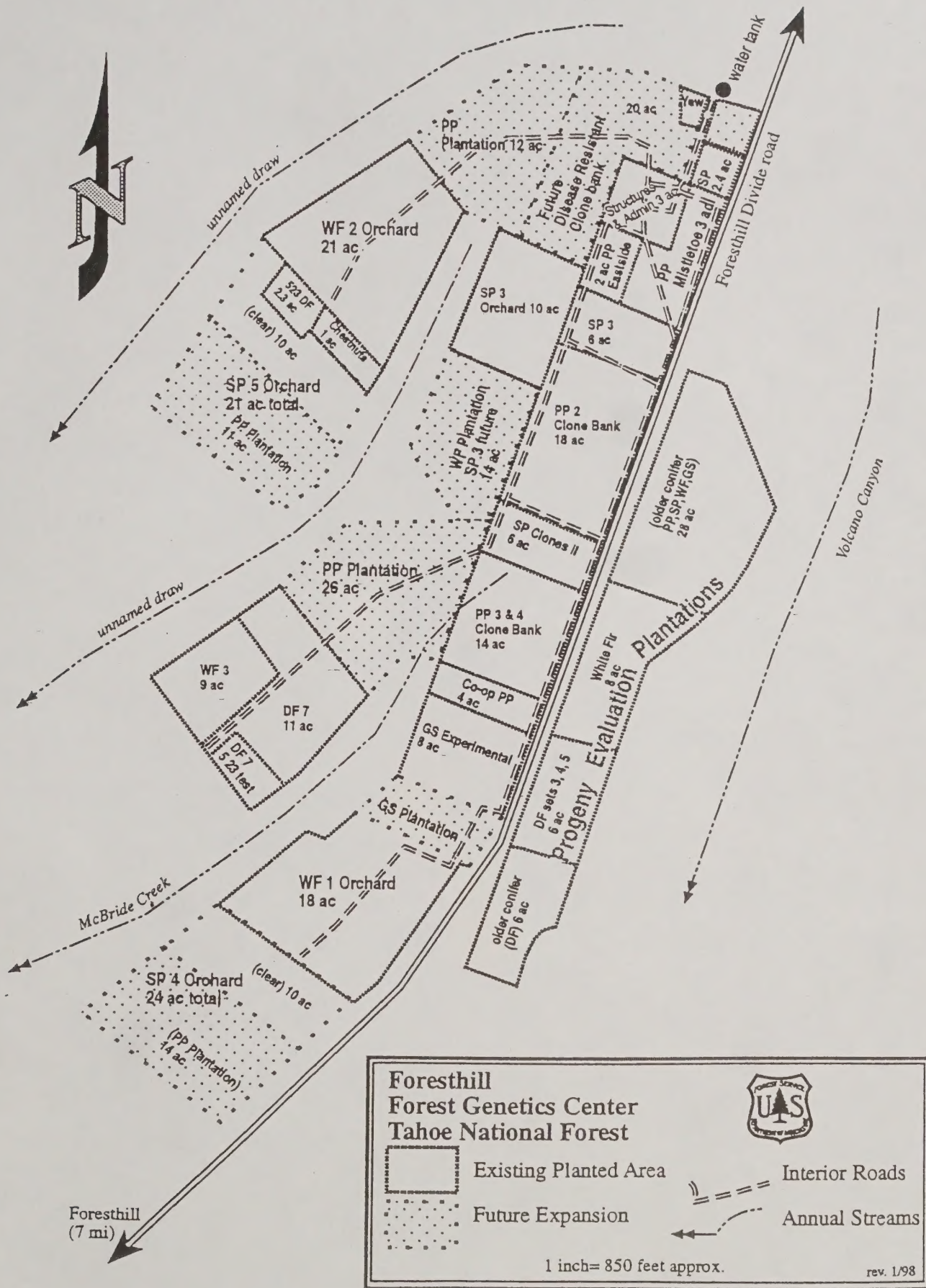
Bark-scoring incompatible graft unions - Sterilize scoring tool between trees with alcohol or Lysol to prevent inadvertent introduction of pathogens. Overall benefit of scoring seems to outweigh risk of introducing pathogens.

Subsoiling in young orchard- If repeated often, tillage can cause a compacted soil layer below. See implications of soil compaction below.

Effects of soil compaction from many years of equipment use - Soil compaction impedes drainage thereby favoring root diseases. This would be of particular concern if you were planting seedlings with small root systems. In general, soil compaction can be kept to a minimum by altering equipment or tillage schedule. The Center staff seems to be very aware of the adverse effects of soil compaction and are already implementing practices to minimize impacts to soil.

References

- Hansen, Everett M. and Katherine J. Lewis. 1997. Compendium of Conifer Diseases. APS press. St. Paul, MN. 101 pg.
- Otrosina, W.J., F.W. Cobb, Jr., and T.L. Popenuck. 1987. Variation in virulence within host specific variants of *Leptographium wagneri*. In DeNitto, G.A., editor. Proceedings of the 35th Annual Western International Forest Disease Work Conference. August 18-21, 1987. Nanaimo, British Columbia. USDA-Forest Service, Pacific Southwest Region, San Francisco, CA p. 93-96.



Foresthill Forest Genetics Center Tahoe National Forest



Existing Planted Area

Future Expansion

Interior Roads

Annual Streams

1 inch = 850 feet approx.

rev. 1/98

